CONFERENCE ON DISARMAMENT

CD/1057
CD/CW/WP.331
13 February 1991

Original: ENGLISH

NEW ZEALAND

REPORT OF A NATIONAL TRIAL INSPECTION

Introduction

Both the New Zealand Government and the New Zealand chemical industry strongly support the efforts being made towards the conclusion of an effective and verifiable comprehensive Chemical Weapons Convention (CWC). As a measure of this support, Government and industry worked together to undertake a national trial inspection in November 1990.

The inspection was conducted at a multi-purpose complex of an agricultural chemical company that produces mainly herbicides. The company was the largest and one of only a few chemical manufacturers in New Zealand.

Through discussions at regional meetings New Zealand has become aware of the burden other small countries believe they will face in implementing the CWC. One objective of the trial inspection was therefore to determine how the lessons learned from earlier inspections were also applicable to those with more modest chemical industries.

The results of the national trial inspection are presented on the basis of the format contained in document CD/CW/WP.213.

A. GENERAL APPROACH

1. Objectives of the national trial inspection

The general objectives of the national trial inspection were to evaluate the procedures for the monitoring of a Schedule 2 chemical as detailed in CD/1033, and in particular:

- To discuss the auditing function both as an independent means of verification and its relationship with scientific monitoring;

- To examine the specific problems of verification for countries with modest chemical industries.

2. Provisions in the draft Convention under which the NTI took place

The national trial inspection followed the provisions governing the monitoring of Schedule 2 chemicals as set forth in annex 2 to article VI.

3. Type of on-site inspection

The national trial inspection comprised an initial visit followed by a routine on-site inspection.

4. Advance information

(a) Declarations

The facility provided a detailed declaration in the format specified in annex 2 to article VI.

(b) Agreement on inspection procedures

A facility agreement was negotiated after the initial visit based on the model agreement contained in CD/1033.

5. Type of facility inspected

The declared facility inspected is a multi-purpose facility using batch processing. The major purpose of the facility is the production of agricultural chemicals.

6. Type of declared activity at the facility

The company does not produce any chemicals currently listed under Schedule 2 of the Rolling Text. For the purposes of the inspection, "PCOC" (para-chloro-ortho-cresol) was treated as a Schedule 2 chemical. The declared activity at the facility during the inspection was the production of the herbicide sodium 4-chloro-2-methyl phenoxybutyrate (MCPB).

7. Actual activity at the facility

During the inspection, the activity at the facility was as declared.

B. DETAILED APPROACH

1. The inspection mandate

The inspection was governed by a facility agreement based on the model provided in CD/1033. This agreement specified the drawings and records to be examined, the equipment to be inspected and points where samples were to be taken. A broad inspection mandate was negotiated between the facility management and the inspection team. The mandate did not limit the access to any part of the facility involved in the production of MCPB.

2. Composition of the inspection team

The inspection team comprised:

- Team leader: A senior official from the Ministry of External Relations and Trade (MERT);

- A Senior Scientist from the Department of Scientific and Industrial Research;

- An auditor (qualified accountant);

- A MERT official.

3. Inspection equipment

Inspection sampling and safety equipment was furnished by the company. As a contingency against possible disputes a portion of each sample was placed in containers brought by the inspection team. The use of safety-related equipment (goggles, gloves, hard hats and boots) was required by the Facility's regulations.

4. Activities prior to the arrival of the inspection team on-site

Two initial visits and negotiation of a detailed Facility Attachment were undertaken over a seven-week period prior to the inspection. Also, advance provision was made of non-sensitive financial background information designed to facilitate audit planning prior to inspection on-site.

5. Advance preparation on-site

No physical preparations on-site were undertaken. A separate working room was provided for inspectors with communciation facilities and secretarial services.

6. Escort and points of contact arrangements

The company nominated a point of contact in the Facility Attachment and informed the relevant personnel prior to the inspection. During the inspection the company provided Facility personnel to act as escorts.

7. Other participants

There were no other participants.

8. Duration of inspection and initial visit

- Initial visit: 4 hours (involvement: 2 persons);

- Preparation of Facility Attachment: 2 days (3 persons);

- Inspection: 2 days (day 1 audit: 1 person, day 2 scientific: 3 persons);

- Chemical analysis: 1 day (3 persons);

- Inspection report: 5 days (2 persons).

9. Measures to protect confidential information

It was agreed in advance by both sides that all financial or process-related data made available to the inspection team would be treated as confidential business information and that no information would be released by the inspection team without the prior consent and knowledge of the company.

10. Opening conference

During the opening conference, the inspectors detailed the aims and scope of the inspection. Company representatives outlined current production and safety regulations to be observed.

11. Types of records needed and/or audited

One inspector focused on a two-day examination of the financial and production records. The types of records used are listed in annex A.

The major records audit tests performed were:

- A mass balance test for the year to date, calculating from declared production the standard consumption quantities of PCOC and comparing these with actual quantities consumed;

- Investigation and resolution of end-product standard costing variances as potential indicators of undeclared activity;

- Tests on the accuracy of the perpetual inventory recording system, including compatibility between systems of all transfers between the different stages of raw materials storage, processing, formulation, packaging and warehouse storage;

- Physical raw material (PCOC and butyrolactone) and finished product (methyl chlorophenoxy acetic acid - MCPA and MCPB) verification and their reconciliation with computerized "Distribution and Supply" system balances which in turn were verified (both quantities and values) against the respective account values in the accounting system (general ledger).

12. Plant orientation tour

Following the opening conference, the inspection team toured the declared areas subject to inspection. These encompassed the MCPB operating process unit, the facility raw materials and bulk storage area, the dangerous goods store, the analytical laboratory and waste treatment facility.

13. Inspection of areas and facility equipment

The following facility areas and equipment were inspected in detail:

- The MCPB operating process unit;

- The facility raw materials, dangerous goods store and bulk storage area;

- Packing area of formulation plant for MCPB product;

- MCPB analysis section of quality control laboratory;

- Weighting and measuring equipment.

14. Inspection of operation procedures

Inspectors observed the following operations:

- Transfer of feed chemicals to reaction vessel;

- Transfer of product to storage tank;

- Analysis of the MCPB product in the facility laboratory.

15. Sampling and sample-taking procedures

Samples were taken by facility personnel as requested by the inspectors as follows:

- Feed chemicals (PCOC and butyrolactone) from drums opened immediately prior to use in MCPB;

- Production in reaction vessel at conclusion of production process;

- Finished product samples of both PCOC-formulated products, MCPA and MCPB.

In each case, duplicate samples were taken - one for off-site analysis and one to be retained by the company.

16. Handling of samples

The inspectors supervised collection of samples by the facility personnel. Samples were labelled with batch numbers and dates and labels initialled by the team chemist and facility contact person. The samples were protected from access by unauthorized persons in the team quarters before transport by courier to the agreed analytical laboratory. There a senior government scientist was responsible for the security of the samples and the subsequently obtained analytical data.

17. Analysis of samples

At the laboratory area for analysis of MCPB and its precursors facility representatives described the test procedures and presented records of typical previous batch analyses. Samples of the feed chemicals, product and reactor contents were analysed off-site at a government laboratory in the weeks following the inspection.

18. Types of analyses

Analytical methods used were nuclear magnetic resonance and gas chromatography mass spectrometry, in addition to titrimetric and colourimetric methods as used in the facility laboratory.

19. Documentation

Separate detailed reports were prepared on both the analytical results obtained at the government laboratory and the findings of the auditor. The company permitted the removal of some confidential financial and process-related data from their premises. This was returned to them following the inspection.

20. Evaluation by inspectors

The evaluation of the inspection facilities and the information gathered during the inspection included:

- The co-operation of the company;
- The usefulness of the lessons learned in previous inspections;
- The degree of certainty in detecting undeclared production during a routine inspection;
- Problems encountered during the inspection.

21. Closing conference

No closing conference was required.

22. Anomalies, disputes and complications

There were no anomalies, disputes or complications.

23. Report of the inspection team

The inspectors' report was prepared off-site during the week following the inspection as part of the detailed appraisal of the trial inspection. The report included data on:

- An account of the inspection activities;
- Results of the analyses;
- Results of the audit;
- Conclusions.

24. Impact of the inspection on the facility operations

The inspection did not result in any actual production losses and had minimal impact on plant operations. Total costs to the company comprised primarily the time and effort required of the facility officials for preparation of the initial declaration and participation in the trial inspection. These were estimated at approximately three days each for the company's chief chemist and manufacturing manager during the negotiation of the Facility Attachment and the inspection. Other company personnel also assisted during the inspection.

C. SPECIFIC ASPECTS - CONCLUSIONS

1. Inspection mandate

The inspection mandate was sufficiently broad not to restrict the work of the team inspectors and to allow them access to every part of the facility. It was appropriate for such an inspection, given the degree of interconnection between every part of the complex. A too narrowly defined inspection could restrict observation in areas that are not declared.

2. Records audit

The trial inspection demonstrated that commercial practices in today's chemical industry give rise to a myriad of overlapping records that can be audited as a means of verifying legitimate chemical production. The trial inspection clearly showed the effectiveness of a detailed financial and production records audit as a verification tool.

In addition to examination of documentation and records available on the declared Schedule 2 material PCOC, "dual purpose" testing of other associated raw materials (butyrolactone) and the two associated completed compounds (MCPA and MCPB) provided corroborative audit evidence.

This testing was considered appropriate in circumstances in which the Schedule 2 chemical may be used in the production of more than one finished compound, and where it is consumed in conjunction with other traceable chemical ingredients. Verification of these elements add credibility to the assurance sought in relation to the use of the Schedule 2 chemical.

An audit of financial records was undertaken in addition to a production records audit to verify declared activities over an extended period of time (which a site inspection may not be certain to identify). The financial records audit also provided a thorough cross-check of production records in the event of a fraudulent dual accounting system (which would most likely occur in the production domain). The independence of both recording systems provides extensive opportunity for the detection of undeclared activity, and should not be underplayed.

Although relatively straightforward, the records and production audit proved to be the most time consuming aspect of the trial inspection. In undertaking the audit the following five-point strategy was adopted (see annex B):

(i) Preliminary Evaluation;

(ii) Production Analysis and Evaluation;

(iii) Financial Substantive Testing Evaluation;

(iv) Internal Control (Compliance Testing) Evaluation;

(v) Analytical Review Evaluation.

It was found that to undertake a records audit an inspector needed experience in both commercial auditing and management/cost accounting from a manufacturing background. A minimum of six to nine working days (depending on the complexities of the operation and number of independent processes) was necessary to complete an audit. An initial visit was essential for determining in detail the function and interrelationship of the various records kept at the facility.

In regard to the overall conclusions of the trial inspection, the audit indicated that the recorded consumption of PCOC was consistent with the company's declaration.

3. Composition of the inspection team

The size and range of skills of the inspection team was found to be adequate for an inspection of a middle-size plant. The trial inspection demonstrated once again the need for expertise and training in chemical production, analytical chemistry and records auditing. For a larger plant a chemical engineer and second auditor would have been necessary.

4. Sample taking and analysis

The range of scientific methods employed involving the collection and analysis of samples from thoughout the production process allowed the inspectors to determine to their satisfaction that legitimate chemical activity was taking place. For an inspection of a larger-scale plant air/soil analysis would have been essential to providing sufficient verification as well as the use of such technologically advanced instruments as Chemical Agent Monitors. Analysis equipment available at the Facility could have been used to undertake some of the analysis.

5. Confidentiality

A large portion of the information obtained by the inspectors was of a confidential character, which the company was anxious to protect. Measures to protect against breaches of confidentiality and to assess responsibility in the event such breaches occur must be incorporated within the Convention. Given the difficulty in determining the degree of confidentiality required for each piece of information, it was found to be more administratively simple to treat all specific documentation used or generated during the inspection as confidential.

6. General inspection approach

The co-operative attitude of the escorts from the facility greatly assisted the inspection. Overall, the co-operation of the company was essential for a speedy and efficient inspection.

The five-tier system of inspection comprising two initial visits, the negotiation of the Facility Attachment, the physical inspection of the Facility, the chemical analysis and the Inspection Report took a total of three weeks to complete. With an additional auditor this time could have been lessened.

7. Resource implications

The trial inspection reinforced the lesson that even for a modest chemical industrial facility subject to routine inspection procedures, a high degree of technical instrumentation and wide variety of skills are needed to properly verify legitimate chemical industry activity. Physical inspection, financial and production records audit and sample analysis are all essential ingredients of an effective inspection régime.

In undertaking such an exercise New Zealand used the full extent of its technical and scientific capability. It is our view that the resources required to attain such a capability are beyond the scope of many countries, and that such countries are therefore likely to face difficulties in meeting CWC obligations. Even though the burden of routine and challenge inspections will be carried by the international inspectorate rather than individual Governments, it is a matter of concern that these countries may find it difficult to establish national authorities which meet CWC requirements.

As the date for the conclusion of a comprehensive Chemical Weapons Convention hopefully draws nearer, countries need to review the technical/legal/scientific resources their regions possess, and consider the potential for co-operation in implementing the Convention. To this end, development of a flexible but standardized methodology of key audit and inspection approaches would be desirable, since this would ensure:

- Streamlined, consistent and effective techniques;
- Prior determination and preparation of the human and physical resources required; and
- Compatibility of inspection treatments.

ANNEX A

TYPES OF DOCUMENTATION FOR A "RECORDS AUDIT"

Not all of the following will be available at every given site. Records and systems differ significantly between operators.

(a) Production

Quality control sheet

Shipment summary

Waste or scrap report

Delivery notes (where goods received direct to production from external sources)

Transfer sheet (required for each separate production or processing site; wherever there is a physical redistribution of chemicals)

Reaction vessel and supervisors daily log-books

Warehouse manual records systems

Batch production sheet

Work-in-process documentation

Finished good and raw material stock status reports

Planned production schedule

Planned raw material purchasing schedule

Batch production standards (alternatively: Bill of Materials)

Raw material supplier data (including actual costs)

Conceptual diagrammatic flow of production processes

Final compound conversion rates and raw material structures

(b) Financial

Accounting policies and procedures manual

Chart of accounts

Trial balances (last financial balance date and previous period-end)

Financial statements and auditors report (last financial balance date)

Auditors memoranda to management

Internal audit working papers (emphasis on relevant systems documentation and previous weaknesses noted)

Organizational and functional charts

Structure of the accounting function (including designation of positions, responsibilities and duties)

Dirpatch notes; (alternatively: Bill of Lading)

Goods received notes (alternatively: delivery dockets)

Customer order notes

Credit notes (both to customers and from suppliers)

Purchase orders

Internal purchase requisitions

Purchase returns orders

Timesheet records

Import documentation/customs clearance

Standard customer price lists (including discounts allowed and customer invoices and statements)

Supplier invoices and statements (payment advice)

Phased annual financial budget (current and previous year)

Forecasts and budgets by production (costs, sales and quantities)

Sales analysis by product line (costs, sales and quantities)

Standard costs of production

Written bank transfer instructions

Raw materials and inventory ledgers transaction audit trails

Manufacturing variance analyses and reports

Manufacturing cost statements (latest current)

Financial statements (relating to the same period as the above)

Internal control guidelines (and results of previous evaluations)

Computerized system documentation (especially existence of in-built data integrity routines)

Note that a complete audit verification of all the above records and documentation, even if available, would be prohibitively resource consuming for the purpose of a National Trial Inspection. Selection and use of these records must be based on their sufficiency and reliability to meet the desired audit procedure objective with the minimum amount of risk of error in the documentation or inherent in the testing procedures themselves. In addition, availability, timeliness and costs of extracting information should be prime considerations.

ANNEX B

CHEMICAL WEAPONS AUDIT METHODOLOGIES: STRATEGY AND TESTS

The following is a detailed checklist of those particular tests which may be successfully incorporated into a records audit programme to maximize the detection of undeclared or prohibited activities.

(i) Preliminary evaluation

To develop a working familiarity with the nature and scope of a facility's operations, and the format of information resources available:

Obtain previous year-end financial statements, auditors report and trial balance as of the same period;

Obtain chart of accounts;

Obtain all relevant documentation to gain an understanding of the business carried out (possibly a Corporate or Business Plan), including organizational charts, accounting function lines of responsibility;

Determine the location and relationship of different related sites involved in the use of the same Schedule 2 chemical;

Look for the existence of inter-company structures and transactions;

Obtain all internal organizational documentation relating to internal audit function, and accounting policies and procedures;

Obtain first initial samples of monthly costing reports.

(ii) Production analysis and evaluation

To audit the processes of data collection, recording and reporting of physical activities:

Compute material balances (using perpetual inventory system records, transaction listings from separate on-line inventory maintenance systems, stock status reports, manual warehouse records, etc.);

Resolve material discrepancies between stock movements and reported actual usage of materials;

Correlate actual production with planned production;

Correlate actual purchasing with planned purchasing;

Correlate both actual and planned purchasing respectively with actual and planned production (in terms of standard consumption rates);

Verify the reconciliation of all stock transfers between separate processes or locations so that the output of one represents, within a reasonable level of tolerance, the input of the next stage. This is to detect any subsequent diversions of product or incomplete product for re-processing and alternative usage;

Compare and analyse actual batch production data (yields, utilization of plant, etc.) with declared production factored by standard yield and capacity rates;

Correlate accounting stock balances with stores records and with a physical stock-take;

Correlate accounting inventory balances with warehouse records and with a physical stock-take;

Verify scrap/wastage records with accounting records;

Verify employee timesheet data with declared activities;

Identification and valuation of off-site inventories, and their reconciliation with the financial accounts;

Have stocks-in-transit at the end of the previous financial year been taken into custody in the current year? Is there significant stock-in-transit at any time?

(iii) Financial substantive testing evaluation

To obtain firsthand (direct) audit evidence of records and documentation to verify the authenticity of declared transactions with respect to:

- Their actual occurrence and existence;
- Their proper recording in original books of entry and subsequent posting (carrying forward) to relevant financial ledgers;
- Their appropriate measurement and valuation;
- Their proprietary (i.e. do they relate to the organization in question?);
- Their completeness (i.e. particularly relevant in an audit of this nature, have all transactions been recorded in full and proper accruals or provisions made?);
- Their disclosure (i.e. through "creative accounting" techniques such as window dressing of information have suspect activities been deliberately concealed?).

This includes the following:

Check material entries and source documentation for:

- Miscellaneous revenues;
- Scrap sales;
- Related party transactions;
- Bank transfers (both in and out);
- Expenditure credits;
- Foreign sales transactions;
- Sales returns and discounts allowed;
- Suspense (balancing) account entries;
- Purchase returns;
- Goods received directly to production from external sources;

Verify authorizations made for significant stock write-offs and scrap disposals;

Check pre-numbered sequences of purchase orders, invoices, credit notes and the like which originate from within the organization;

Investigate long outstanding (and potentially secretive) payments made recorded by the bank but overdue in the bank reconciliations;

Investigate the aged debtors analysis of customers of the relevant finished products in question as to well overdue debts which may be fictitious and questionable;

Analysis of standard cost variations with actual recorded costs, and the nature and extent of their occurrence (i.e. due to fluctuations in production efficiency levels, purchasing activities, etc.), including the resolution thereof;

General arithmetic tests for accuracy in recording and posting multiple and complex transactions (especially where foreign currencies are concerned);

Identification of an auxiliary set of financial records maintained for the benefit of reporting to an overseas parent company. Is this reconciled to the host country's results?

Reconciliation of manufacturing cost recovery/credit accounts in which accumulated costs are ultimately absorbed by closing off these accounts to specific manufacturing and other functional control accounts at relevant period-ends;

Investigate authorization and underlying documentation for material accounting system stock adjustment entries;

Check for unfilled purchase orders outstanding for a longer than reasonable period of time in the event of actual deliveries and undeclared raw materials usage activity;

Analysis of freight expense account and reconciliation of a sample of these transactions with the original documentation of actual shipments made.

(iv) Internal control (Compliance testing) evaluation

To critically evaluate the usefulness and reliance which may be placed on underlying fundamental accounting processes and systems, and to identify related weaknesses for subsequent follow-up and the design of alternative audit procedures. A feature of strong financial and accounting controls is that whole physical processes may be broken down into smaller sub-components so that responsibilities and duties are separated and that one sub-component automatically (and unconsciously) performs a cross-check of the other's work:

Test a number of transactions through the whole purported recording and accounting system (i.e. from "cradle to grave") to verify:

- The existence of controls;

- The operation of controls;

- The effectiveness of these controls;

Check whether internal control guidelines are available and currently in force: evaluate latest internal control evaluation;

Check and prove the existence of relevant reconciliations, particularly bank reconciliations (payments and/or deposits not recorded in the accounts system), supplier statement reconciliations with invoices for evidence of accounting for all raw material purchases, etc.;

Check and analyse sales returns and discounts allowed procedures in the event of excessive credits made to reduce actual invoiced amounts in an attempt to conceal activities in which undeclared diversions of raw materials have taken place (i.e. check entries against original documentation and the company's internal policies);

Analyse the purchase return process (and related documentation) to ensure that purchase returns are independently authorized, initiated and recorded (with corresponding physical and financial recording entries) and therefore prevent the claiming of fictitious or exaggerated returns intended to conceal the diversion of raw materials.

(v) Analytical review evaluation

To analyse comparisons of trends and primary accounting and physical ratios with similar budgeted or prior year benchmarks. Fluctuations would be highlighted and require satisfactory resolution. Well established industry standards provide other useful benchmarks.

These are many and varied, and their use depends primarily on the circumstances of each operating situation. Nevertheless they should always be appropriate to an auditing objective, and seek to confirm or dispel and audit conclusion already derived based on alternative audit procedures.

An example of a significant ratio is the percentage of "Cost of sales" to Gross Sales which one might expect to remain relatively constant over a period in excess of one to two years or longer. Any fluctuation might reveal potential mis-statements of fact with respect to closing inventories, purchases or sales itself the prime indicators of undeclared and prohibited chemical activities. This would then be sufficient cause to investigate the variations further. A greater refinement would be achieved by performing the above outlined test on financial information at the lowest practicable level, i.e. on a product line basis.